

1) Expand and Simplify

$$\begin{aligned} \text{a) } (3x-4)(x+2) \\ = 3x^2 + 6x - 4x - 8 \\ = 3x^2 + 2x - 8 \end{aligned}$$

$$\begin{aligned} (2x-3)(2x+3) \\ = 4x^2 + 6x - 6x - 9 \\ = 4x^2 - 9 \end{aligned}$$

$$\begin{aligned} \text{b) } (3x+4)(3x+4) \\ = 9x^2 + 12x + 12x + 16 \\ = 9x^2 + 24x + 16 \end{aligned}$$

$$\begin{aligned} \text{c) } (2x-1)^2 \\ (2x-1)(2x-1) \\ = 4x^2 - 2x - 2x + 1 \\ = 4x^2 - 4x + 1 \end{aligned}$$

$$\begin{aligned} \text{d) } (5x+2)(3x-2) + (x-8) \\ = 15x^2 - 10x + 6x - 4 + x - 8 \\ = 15x^2 - 10x + 6x + x - 4 - 8 \\ = 15x^2 - 3x - 12 \end{aligned}$$

$$\begin{aligned} \text{e) } 2x(3x+3x+1) \\ = 6x^2 + 6x^2 + 2x \\ = 12x^2 + 2x \end{aligned}$$

$$\begin{aligned} \text{f) } 2x(12x-4) \\ = 24x^2 - 8x \end{aligned}$$

$$\begin{aligned} \text{g) } 2(x^2+3x-4) \\ = 2x^2 + 6x - 8 \end{aligned}$$

2) Factor

$$\begin{aligned} \text{a) } & 3x^2 + 12 \\ &= 3(x^2 + 4) \end{aligned}$$

$$\begin{aligned} \text{c) } & x^2 + 9x + 18 \\ &= (x+6)(x+3) \end{aligned}$$

$$\begin{aligned} \text{e) } & x^2 - 4x - 21 \\ &= (x-7)(x+3) \end{aligned}$$

$$\begin{aligned} \text{g) } & 4x^3 - 25x \\ &= x(4x^2 - 25) \\ &= x(2x+5)(2x-5) \end{aligned}$$

$$\begin{aligned} \text{i) } & x^2 - 3x - 4 \\ &= (x+1)(x-4) \end{aligned}$$

$$\begin{aligned} \text{b) } & x^2 - 36 \\ &= (x-6)(x+6) \end{aligned}$$

$$\begin{aligned} \text{d) } & 18x^2 - 2 \\ &= 2(9x^2 - 1) \\ &= 2(3x-1)(3x+1) \end{aligned}$$

$$\begin{aligned} \text{f) } & 9x^2 + 15x \\ &= 3x(3x+5) \end{aligned}$$

$$\begin{aligned} \text{h) } & 2x^2 - 24x + 70 \\ &= 2(x^2 - 12x + 35) \\ &= 2(x-5)(x-7) \end{aligned}$$

$$\begin{aligned} \text{j) } & y^2 - 11y + 24 \\ &= (y-3)(y-8) \end{aligned}$$

3) Factor fully. Check by expanding.

a) $k^2 - 36$

$$= (k+6)(k-6)$$

check:

$$= (k+6)(k-6)$$

$$= k^2 - 6k + 6k - 36$$

$$= k^2 - 36$$

c) $25y^2 + 100$

$$= 25(y^2 + 4)$$

check

$$= 25(y^2 + 4)$$

$$= 25y^2 + 100$$

e) $2z^2 + 16z + 30$

$$= 2(z^2 + 8z + 15)$$

$$= 2(z+3)(z+5)$$

check

$$= 2(z+3)(z+5)$$

$$= 2(z^2 + 5z + 3z + 15)$$

$$= 2(z^2 + 8z + 15)$$

$$= 2z^2 + 16z + 30$$

b) $98 - 50p^2$

$$= 2(49 - 25p^2)$$

$$= 2(7-5p)(7+5p)$$

check

$$= 2(7-5p)(7+5p)$$

$$= 2(49 + 35p - 35p - 25p^2)$$

$$= 2(49 - 25p^2)$$

$$= 98 - 50p^2$$

d) $x^2 + 6x + 9$

$$= (x+3)(x+3)$$

check

$$= (x+3)(x+3)$$

$$= x^2 + 3x + 3x + 9$$

$$= x^2 + 6x + 9$$

f) $mn^2 + 5mn + 6m$

$$= m(n^2 + 5n + 6)$$

$$= m(n+2)(n+3)$$

check

$$= m(n+2)(n+3)$$

$$= m(n^2 + 3n + 2n + 6)$$

$$= m(n^2 + 5n + 6)$$

$$= mn^2 + 5mn + 6m$$